CLAIMS

What is claimed is:

1. A system for use in navigating an implantation of a selected construct, comprising:

a first member and a second member of the construct adapted to selectively interact with each other after implantation;

a localization element selectively associated with at least one of said first member and said second member;

a detector to detect said localization element when said localization element is associated with at least one of said first member and said second member; and

a processor operable to assist in navigation of said second member relative to said first member;

wherein said processor is operable to receive position information for at least one of said first member and said second member from said detector and further operable to determine a relative position of the other of said at least one of said first member and said second member;

wherein said relative position is operable to allow a navigation of at least one of said first member and said second member.

2. The system of claim 1, wherein said first member includes a fastener operable to be fixed to a selected anatomical portion having a first fixable portion for being fixed to the selected anatomical portion and a second engageable portion to be connected to said second member;

wherein said second member includes a connector to operably interconnect said first member and a third member.

3. The system of claim 2, wherein said third member is selected from a group including a fastener, a connector, an anatomical portion, and combinations thereof.

4. The system of claim 1, wherein said first member and said second member are each fasteners having a fastener portion and an engageable portion;

wherein a connector is operable to interconnect said first member and said second member in a selected orientation.

5. The system of claim 1, wherein said tracking element is selected from a group comprising an electromagnetic tracking device, an optical tracking device, a conductive tracking device, a fiberoptic tracking device, an acoustic tracking device, and combinations thereof.

6. The system of claim 1, wherein said detector is selected from the group comprising an electromagnetic detector, an optical detector, a conductive detector, a fiberoptic detector, an acoustic detector, and combinations thereof.

7. The system of claim 1, wherein said localization element includes:

an extender operable to be removably connected to at least one of said first member and said second member; and

a tracking element operable to be detected by said detector to detect the position of said tracking element in a detector space.

8. The system of claim 7, wherein said processor is operable to determine a position of at least one of said first member and said second member after detection of said tracking element by said detector.

9. The system of claim 7, wherein said localization element includes a plurality of localization elements such that each of said first member and said second member includes a localization element extending therefrom.

10. The system of claim 1, further comprising:

a third member positionable relative to said first member and said second member in an anatomical portion;

wherein the position of said third member is detectable with said detector and said processor is operable to determine a position of said third member relative to said first member and said second member.

11. The system of claim 10, further comprising:

a fourth member;

wherein said first member, said second member, and said third member are operable to be fixed relative to the anatomical portion;

wherein said processor is operable to determine a real time position of said fourth member relative to said first member, said second member, and said third member to substantially position said fourth member in a selected position relative to said first member, said second member, and said third member.

12. The system of claim 1, wherein said second member is substantially navigated at least one of percutaneously and minimally invasively.

13. The system of claim 1, wherein said first member and said second member are portions of a construct selected from a group including an acetabular implant, a spinal fixation implant, a spinal fusion implant, a humeral implant, a femoral head implant, a knee implant, a bone plate implant, and combinations thereof.

14. The system of claim 1 further comprising:

a navigable needle positionable relative to at least one of said first member and said second member such that said navigation system is operable to determine a position for a third member relative to said of at least one of said first member and said second member.

15. The system of claim 1, wherein said processor assists in providing an alignment of said of at least first member and said second member in at least two planes.

16. The system of claim 15, wherein said two planes are substantially orthogonal to each other.

17. The system of claim 15, wherein said first member is selected from at least one of a screw and a connector and wherein said second member is selected from at least one of the other of said screw and said connector.

18. The system of claim 17, wherein said connector is selected from a group comprising a substantially rigid rod, a steerable connector, a deformable connector, a flexible connector, and combinations thereof.

19. The system of claim 1, further comprising:

an imageless display;

wherein said processor is operable to allow navigation of at least one of said first member and said second member in a substantially imageless manner.

20. The system of claim 19, wherein said display displays at least one of said first member and said second member with an icon.

21. The system of claim 20, wherein said display displays an atlas map superimposed over said icons of said at least first member and said second member.

22. A system for use in determining a position of a first implantable member and planning and navigating relative to the first member for positioning a second member to interact with said first member, the system comprising:

a tracking element associated with the first member to assist in determining a position of the first member;

a first detector to detect said tracking element;

a processor to determine a position of the first member depending upon the detection of said first detector;

a navigable instrument operable to move the second member relative to the first member; and

a second detector to detect said navigable instrument;

wherein said processor is operable to determine a position of the second member relative to the first member in at least two planes;

wherein said processor is operable to navigate said navigable instrument relative to said tracking element for positioning of the second member relative to the first member.

23. The system of claim 22, wherein said first detector and said second detector are a single detector.

24. The system of claim 23, wherein said detector is selected from the group comprising and the electromagnetic detector, an optical detector, a conductive detector, a fiber optic detector, an acoustic detector, and combinations thereof.

25. The system of claim 22, wherein said navigable instrument is operable to engage the second member to move the second member relative to the first member.

26. The system of claim 22, wherein said processor is operable to navigate said navigable instrument relative to said tracking elements such that said second member is moved to a selected position relative to said first member substantially at least one of percutaneously and minimally invasively.

27. The system of claim 22, further comprising:

an imaging device to acquire a patient image of a selected portion relative to at least one of the first member and the second member to confirm the displayed position of at least one of the first member and the second member.

28. The system of claim 22, wherein said processor provides an alignment along at least two planes relative to the first member and the second member.

29. The system of claim 28, wherein said planes are substantially orthogonal.

30. The system of claim 22, wherein said processor determines the position of the first member and the second member in a substantially patient imageless manner.

31. The system of claim 30, further comprising:

a display to display a first icon to represent a position of the first member and a second icon to represent a position of the second member relative to said first member.

32. The system of claim 31, wherein said processor superimposes an atlas model over the first icon and the second icon.

33. A method of implanting a construct having at least a first member, a second member, and a third member the method comprising:

positioning the first member;

determining a position of the first member in a selected space;

positioning the second member relative to the first member;

determining a position of the second member in the selected space;

navigating the third member relative to the first member and the second member, including:

determining a real time optimal position of the third member in the selected space; and

determining a real time position of the third member relative to at least one of the first member and the second member.

34. The method of claim 33, further comprising saving at least one of the determined position of the first member and the determined position of the second member.

35. The method of claim 33, wherein determining a position of at least one of said first member and said second member includes:

operably interconnecting a tracking element to at least one of said first member and said second member; and

detecting the position of the tracking element.

36. The method of claim 35, wherein said tracking element is selected from a group comprising an electromagnetic tracking device, an optical tracking device, a conductive tracking device, a fiber optic tracking device, an acoustic tracking device, and combinations thereof.

37. The method of claim 35, further comprising determining a selected alignment relative to said determined position of the first member and said determined position of the second member.

38. The method of claim 37, wherein selecting a characteristic of at least one of the first member, the second member and the third member includes selecting a characteristic from a group including a length, a radius, a diameter, an offset, a flexibility, an alignment, and combinations thereof.

39. The method of claim 33, further comprising:

verifying a final position of the third member relative to at least one of the first member and the second member.

40. The method of claim 39, wherein verifying the position of the third member includes obtaining a image of an area including at least one of the first member and the second member and said third member.

41. The method of claim 33, further comprising:

displaying the determined real time position of said third member on a display;

wherein said display assists a user in moving the third member relative to the optimal position.

42. The method of claim 33, further comprising:

selecting a characteristic of the third member for implantation relative to the first member and the second member; and

positioning a fourth member relative to said first member and said second member to be interconnected by said third member in the selected orientation.

43. The method of claim 33, wherein determining a real time optimal position includes determining a real time optimal position along at least two planes for the third member.

44. The method of claim 43, wherein said two planes are substantially orthogonal to each other.

45. The method of claim 33, further comprising:

determining a contour of a soft tissue relative to at least one of the first member, the second member, and the third member;

wherein determining a real time optimal position includes determining an insertion point through the soft tissue for the third member.

46. The method of claim 45, wherein determining a contour of the soft tissue includes moving a navigable probe relative to the soft tissue.

47. The method of claim 33, wherein positioning the first member, positioning the second member, and navigating the third member includes at least one of percutaneous and minimally invasively placements of at least one of a pedicle screw and a connector.

48. The method of claim 47, wherein navigating the third member includes at least one of percutaneously and minimally invasively moving the third member relative to the first member and the second member to interconnect the first member and the second member.

49. The method of claim 33, wherein at least one of determining a position of the first member and determining a position of the second member includes positioning a localization element on at least one of the first member and the second member.

50. The method of claim 33, wherein at least one of determining a position of the first member and determining a position of the second member includes associating a trackable probe to at least one of the first member and the second member.

51. The method of claim 33, wherein navigating the third member is performed substantially in a patient imageless manner.

52. The method of claim 33, wherein determining a real time position of the third member includes knowing substantially only the position of the third member relative to at least one of the first member and the second member.

53. A method of implanting a construct of at least a first member, a second member, and a third member substantially at least one of percutaneously and minimally invasively, comprising:

selecting a final orientation of at least one of the first member, the second member, and the third member relative to at least one other of the first member, the second member, and the third member;

determining the position of the first member and the second member;

displaying said position of each of said first member and the second member;

selecting a characteristic of at least one of said first member, said second member, and said third member; and

navigably positioning at least one of said first member, said second member, and said third member relative to another of at least one of said first member, said second member, and said third member to achieve the selected final orientation.

54. The method of 53, further comprising:

positioning the first member and the second member substantially at least one of percutaneously and minimally invasively relative to a selected anatomical portion; and

detecting a position of a navigational element relative to said first member and said second member to determine the position of the first member and the second member.

55. The method of claim 54, wherein said detector is selected from the group comprising and the electromagnetic detector, an optical detector, a conductive detector, a fiber optic detector, an acoustic detector, and combinations thereof.

56. The method of claim 53, wherein at least one of the first member, the second member, and the third member is selected from a group including a fastener, a rod, an acetabular cup, a femoral component, a tibial component, a glenoid component, a bone plate, and combinations thereof.

57. The method of claim 53, wherein displaying a position includes forming a graphical representation of the determined position of the first member and the second member and displaying it in user readable format.

58. The method of claim 53, wherein selecting a characteristic of at least one of the first member, the second member and the third member includes selecting a characteristic from a group including a length, a radius, a diameter, an offset, a flexibility, an alignment, and combinations thereof.

59. The method of claim 53, further comprising:

navigably positioning the third member including:

moving a substantially steerable catheter relative to the first member and the second member; and

displaying a real time position of at least a portion of the third member relative to the first member and the second member.

60. The method of claim 53, wherein selecting the final orientation includes selecting at least one of an alignment in a first plane and an alignment in a second plane.

61. The method of claim 60, further comprising positioning a fourth member relative to the first member and the second member to assist in achieving the selected final orientation.

62. The method of claim 61, further comprising:

navigably positioning the third member including:

moving the third member relative to at least one of the first member, the second member, and the fourth member to substantially fix the construct in the selected final orientation.

63. The method of claim 53, further comprising:

obtaining a patient image to verify the positioning of the first member, the second member, and the third member in the selected final orientation.

64. The method of claim 53, further comprising:

selecting a pedicle screw for at least one of the first member, the second member, and the third member and a connector for at least one of another of the first member, the second member, and the third member.

65. The method of claim 64, wherein navigably positioning at least one of the first member, the second member, and the third member includes:

positioning at least a first screw relative to second screw to allow for interconnection in a selected alignment.

66. The method of claim 64, wherein navigably positioning at least one of the first member, the second member, and the third member includes:

displaying a movement of the connector relative to substantially only at least one of the screws.

67. A system for use in determining a position of a first implantable member and planning and navigating relative to the first member for positioning a second member to interact with said first member, the system comprising:

a tracking element associated with the first member to assist in determining a position of the first member;

a detector to detect said tracking element;

a processor to determine a position of the first member depending upon the detection of said detector;

a navigable instrument operable to move the second member relative to the first member; and

wherein said processor is operable to determine a position of the second member relative to the first member in at least one plane;

wherein said processor is operable to navigate said navigable instrument relative to said tracking element for positioning of the second member relative to the first member.

68. The system of claim 67, wherein said detector is selected from the group comprising and the electromagnetic detector, an optical detector, a conductive detector, a fiber optic detector, an acoustic detector, and combinations thereof.

69. The system of claim 67, wherein said processor is operable to navigate said navigable instrument relative to said tracking elements such that said second member is moved to a selected position relative to said first member substantially at least one of percutaneously and minimally invasively.

70. The system of claim 67, further comprising:

an imaging device to acquire a patient image of a selected portion relative to at least one of the first member and the second member to confirm the displayed position of at least one of the first member and the second member.

71. The system of claim 67, wherein said processor provides an alignment along at least two planes relative to the first member and the second member.

72. The system of claim 71, wherein said planes are substantially orthogonal.

73. The system of claim 67, wherein said processor determines the position of the first member and the second member in a substantially patient imageless manner.

74. The system of claim 73, further comprising:

a display to display a first icon to represent a position of the first member and a second icon to represent a position of the second member relative to said first member.

75. The system of claim 74, wherein said processor imposes a selected anatomized model image relative to the first icon and the second icon.

76. The system of claim 75, wherein said selected anatomical model image is a patient acquired image displayed on the display relative to the first icon and the second icon.

77. The system of claim 67, wherein the first member includes a first member, a third member and a fourth member wherein said processor is operable to determine a point for each of the first member, the third member and the fourth member and navigates said second member relative to each of the first member, third member, and fourth member.